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PATIENT EDUCATION AND PROVIDER GUIDELINES FOR STEROID INDUCED HYPERGLYCEMIA

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Allogeneic stem cell transplantation is an aggressive treatment option for patients with hematologic malignancies and bone marrow failure disorders. In recent years allogeneic transplant is offered to older patients using a reduced intensity or non-myeloablative approach. With the increasing age of our patient population there is also an increase in co-morbidities. The incidence of diabetes in the U.S. population is 8.3% and in people over 65 it is 26.9%. [1] We are increasingly taking care of patients who have diabetes prior to transplant and also patients that develop hyperglycemia after starting steroids. Steroids increase blood glucose by stimulating gluconeogenesis resulting in an increase in hepatic glucose release. Glucocorticoids (GC) are potent immunosuppressive agents and are first line treatment of graft versus host disease.

Hyperglycemia may cause serious immediate problems and also lead to long term issues. High blood sugar, levels greater than 200 mg/dl, can lead to dehydration, weight loss, and poor nutrition, increased risk of infection due to functional decline of neutrophils, electrolyte imbalance and acidosis.[2] Long term issues include changes in vision, kidney and vascular diseases.

The majority of patients who develop hyperglycemia during transplant with not need long term treatment once the steroids are stopped. Patients with pre-existing diabetes will need adjustment of the hypoglycemic agents during steroid treatment. We developed patient teaching guidelines and staff treatment guidelines for managing hyperglycemia in the transplant setting. Standardized teaching tools for patients in both English and Spanish were developed. Guidelines for nurses and providers were developed to provide a standard approach to management of hyperglycemia.

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EXPERIENCE WITH A SIMPLE INTERVENTION TO DECREASE CLOSTRIDIUM DIFFICILE INFECTIONS (CDIs) ON A BONE MARROW TRANSPLANT UNIT

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Cincinnati Children's Hospital Medical Center's Bone Marrow Transplant Unit is a 24 bed critical care environment that cares for highly complex immune compromised patient population with underlying oncologic, immunologic, marrow failure or metabolic disorders.

Prospective surveillance for health care associated infections (HAI's) is performed through the Infection Control Program and reviewed on a semi-annual basis with unit leadership and staff. Daily laboratory alerts for C. difficile toxin are followed up by infection control staff to assure timely institution of contact precautions. For CDI patients, hand washing is specified as the hand hygiene practice to be used at the end of care and before exiting a patient's room.

During 2009, surveillance identified an increase in CDI cases on the BMT unit well above the previous baseline. Isolation and environmental cleaning practices on the unit were reviewed. Bleach was implemented for discharge cleaning of all CDI patient rooms and patient bathrooms. Hand washing on patient room exit was reinforced with education and signs. Staff began implementing initiatives to de-clutter the unit and facilitate environmental cleaning. CDIs on the unit continued to increase. Following the semi-annual data review, in September of 2010, alcohol gels were removed from all patient rooms on the unit and a "gel in, wash out" initiative was adopted. The number of CDI cases has fallen and time between CDIs has increased. There have been no new CDIs recognized on the unit in 8 of the last 12 months.

While there were many improvement initiatives focused on the environment, we believe the greatest impact for the decrease in CDIs came from the simple maneuver of forcing hand washing with soap and water before exiting a patient room. This simple change adds to patient safety by removing potential pathogens that may not be removed or killed by hand gel sanitizing products.

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INCIDENCE OF ADRENAL INSUFFICIENCY IN CHILDREN WITH SANFILIPPO SYNDROME TYPE A FOLLOWING UUCB TRANSPLANT – A RETROSPECTIVE STUDY

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Background: We observed an unusually high incidence of adrenal insufficiency in children with Sanfilippo Syndrome Type A (MPSIIIA) after unrelated donor umbilical cord blood transplantation. Many of these children experienced repeated hospitalizations and emergency department visits due to adrenal crisis.

Patients and Methods: We conducted a retrospective chart review to evaluate the incidence and severity of adrenal complications following unrelated umbilical cord blood transplant in children with MPS IIIA. Seventeen consecutive children with MPS IIIA were transplanted between 2001 and 2010; 10 patients were male and 7 were female. Median age at transplant was 2.88 years (1.05-4.96). All children received an unrelated umbilical cord blood transplant following myeloablative conditioning with busulfan, cyclophosphamide and ATG. 1 child was not evaluable due to death prior to day +100. Eight children received Cyclosporine and low dose steroids as GVHD prophylaxis and 8 children received Cyclosporine and Mycophenolate. Of the 8 children who received Cyclosporine and Mycophenolate, 7 required methylprednisolone post transplant (6 for engraftment syndrome, 1 for pulmonary edema). Cortisol deficiency was defined as an AM fasting cortisol of <5mcg/dl on or after day +100.

Results: Thirteen of 16 (81%) children transplanted for MPSIIIA became cortisol deficient post transplant. Six of 8 (75%) children who received CYA+low dose steroid became adrenally insufficient. Seven of 8 (87%) children who received CYA+MMF became adrenally insufficient. Of the 8 children who received CYA+MMF, 7 children required methylprednisolone (2mg/kg) for engraftment syndrome (n = 6) or pulmonary edema (n = 1). Six of 7 (86%) children who received CYA+MMF and additional steroids became adrenally insufficient. Seven of 16 (44%) children developed chronic GVHD and 6 of 7 (86%) of the children who developed cGHVD were also adrenally insufficient. Nine of 16 children (56%) did not develop cGVHD and 7 of 9 (78%) children with no evidence of cGVHD were adrenally insufficient.

Conclusions: Adrenal insufficiency developed in the majority of patients with MPS IIIA transplanted with umbilical cord blood after myeloablative chemotherapy. The presence of chronic GVHD and type of prophylactic GVHD regimen did not appear to be related to the incidence of adrenal insufficiency in these children. The cause of this complication is currently unknown but should be the subject of future investigations.

Table 1. Patient Characteristics

	Cortisol Deficient n = 13	Non-cortisol deficient n = 3
Male	8	1
Female	5	2
GVHD Prophylaxis CYA+low dose steroids	6	2
GVHD Prophylaxis CYA+MMF	7	1
Additional steroids in the MMF group	6	1
Chronic GVHD present	6	1
No cGVHD	7	2